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PEYOTE (*LOPHOPHORA WILLIAMSII*) AND PLANTS CONFUSED WITH IT

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A STATE of great confusion exists at the present time in the ethnobotany of peyote. This is due partly to long and close association of peyote (*Lophophora Williamsii* (Lemaire) Coulter) with other plants in religious and therapeutic uses and partly to fragmentary and conflicting records of the use of the narcotic plants of Mexico in the early centuries after Spanish settlement of the country. As a result of this confusion, ethnological and other investigations of the narcotic cactus are greatly hindered by widespread ambiguity in plant names. A clear understanding of the complex of plants associated or confused with *Lophophora Williamsii* is absolutely essential to the further progress of anthropological investigation of the ever-increasing peyote-cult of the United States.¹

I. Common names of *Lophophora Williamsii*.²

The variety of common names which refer to *Lophophora Williamsii* in the United States and Mexico is so great as to demand thorough consideration of the etymology, use, and significance of each name. Moreover, such treatment may be of value in bringing attention to certain otherwise hidden facts attendant upon the aboriginal

¹ Footnotes will be found on pages 78-80.

use or upon the ethnobotanical relationships of the cactus with other economic plants.

1. *Peyote*.

Lophophora Williamsii is most commonly called *peyote*. This is the Spanish form of the ancient Nahuatl *peyotl*. It is variously spelled: *piote*, *piotl*, *peote*, *pejote*, *peyot*, *pellote*, *pezote*, and *peyori*. In Starr County, Texas, the centre of the peyote trade,¹ the corruption *challote* is used by merchants (3).^{*} The related corruption *chautle* or *chaute* are Mexican and Texan names for the supposed medicinal cactuses, *Ariocarpus fissuratus* (Engelm.) K. Schum. (29) and *A. retusus* Scheidw.³ (2). *Peyote cimarrón* is used to designate *Ariocarpus fissuratus* (29) and, in Durango, *Astrophytum myriostigma* Lem. (2). This term is also used, in Nayarit, as a name for *Senecio Hartwegii* Benth., a member of the *Compositae*, and, in Sinaloa, to designate *Cranichis? speciosa*⁴ LaLlave & Lex. and *Bletia campanulata* LaLlave & Lex., members of the *Orchidaceae* (7).

The term *peyote* is used and understood by Indians and white men both in Mexico and the United States; consequently it has become the commercial term. Each tribe, however, possesses its own vernacular name for the cactus, although several plains tribes have adopted the name *peyote* as a naturalized word.

Several etymologies have been proposed for this word. It has been suggested (33, 20) that *peyote* is derived from the Aztec *pepeyoni*⁵ or *pepeyon* ("to excite") or from *peyona-nic* ("to activate" or "to stimulate").

Molina (13) derived *peyote* from the Aztec *peyutl*, which, freely rendered, means something soft, silky, and fluffy, like a cocoon or web.⁶ The comparison of the silky tufts of matted hair on the crown of the cactus to cater-

*Numbers in parentheses refer to the Bibliography.

pillar cocoons is assumed by those supporting this etymology. At first, this supposition might not seem improbable. In support of this theory, Safford (22) has called attention to a composite, *Cacalia cordifolia* HBK., *cachane*, which is known and marketed in Jalisco under the name *peyotl* (33). This plant has a soft, tuberous root with an endument of velvety hairs, in appearance much like a cocoon. Hernandez (8) called this plant *Peyotl Xochimilicensis*, specifically emphasizing its febrifugal properties and its "wooly rootlets." The same writer described *Lophophora Williamsii* under the name *Peyotl Zacatensis, seu radice molli et lanuginosa*, calling attention again to medicinal and intoxicating properties as well as to the lanuginous appearance of the plant.


Recent investigation has revealed a score or more of very dissimilar plants all known under the term *peyote*. Most of these plants have no soft parts which could be likened to cocoons. Indeed, several are exceedingly hard. Might Hernandez not have called the two plants *peyote* because of some similarity other than the woolliness of parts of the vegetative body? The Molina etymology does not satisfactorily explain the application of the word *peyote* to the great array of plants known under that name in Mexico.

A more recent etymology has been proposed by B.P. Reko (7). It suggests that *peyote* arose directly from the Aztec *pi-yautli*, in which *pi* is a diminutive term and *yautli* (or the alternative *yolli*) is a collective noun signifying herbs whose action is narcotic.⁷ In this broad sense, *peyote* would include many plants having, perhaps, nothing in common in vegetative parts, but all possessing narcotic (or perhaps medicinal) properties. A survey of the many plants called *peyote* (page 70) indicates that they all agree in having a narcotic or supposed medicinal property. This etymology has been carried further (7), as in

EXPLANATION OF THE ILLUSTRATION

FIGURE I. Entire plant of peyote (*Lophophora Williamsii* (Lem.) Coult.) showing details of the chlorophyll-bearing crown of the plant. Variation in the number and appearance of the ribs has given rise to much confusing taxonomic controversy, but this thirteen-ribbed form is typical of older plants. It is this crown which, when cut from the root and dried, is known as the *mescal button*, two of which are illustrated in figure II. Natural size.





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the case of the rubber-producing shrub of this region called *guayule* (*Parthenium argentatum* A. Gray). *Guayule* is resolved into *hua*, a prefix denoting magnitude, and *yolli*, thus suggesting that the name means a large herb with a narcotic smell.⁸ With the etymology of Reko, the confusion between the Mexican word *piule* (page 67) and *peyote* has been explained as the result of common etymology.

This derivation, having only recently appeared in a publication in the English language (27), has not received wide attention in America. There is some doubt as to the validity of certain phonetic changes involved in this etymology in the minds of American Uto-Aztecan linguistic experts. However, in view of the apparent confirmation it has received from botanical sources, it would seem a more logical explanation than the Molina etymology, and, as such, deserves further linguistic examination.

The diminutive *peyotillo* (*peotillo*) signifies similarity in appearance to *Lophophora Williamsii*. Under this name are grouped such succulents as *Dolichothele longimamma* Britton & Rose, *Solisia pectinata* Britton & Rose, and *Pelyciphora aselliformis* Ehrenb. (3).

2. *Mescal*.

A name now almost as universally used as peyote is *mescal* (*mezcal*). The dried tops of the cactus are sold under the name *mescal buttons* as well as under the name *peyote buttons*, since, on drying, they shrink to the size and shape of large coat-buttons. They are also, though never correctly, called *mescal beans*.

The origin of the term *mescal* is found directly in the Aztec word for *Agave*-brandy—*mexcalli*. As applied to *Lophophora Williamsii*, the origin is probably due to a confusion of peyote with the alcoholic beverage prepared from the juice of *Agave* spp. This confusion, no doubt,

arose as the result of the mistaken idea that peyote-intoxication is similar to that produced by alcohol. The logical inference from such a comparison is that the use of peyote is surrounded by the same social, moral, and physical evils associated with alcohol. I found that, for this reason, the term *mescal*, as applied to peyote, is very often resented by the Indians who use the cactus. Much of the hostility of uninformed persons towards the peyote-cult has been based on this erroneous association of ideas.

It has been stated (23) that the application of this name to peyote is the result of the former use of the *mescal bean* (*Sophora secundiflora* (Orteg.) Lag. ex DC.) among the plains Indians to induce visions and that the beans in turn received the name *mescal* because they were occasionally crushed and added to *Agave*-brandy to render it more intoxicating.⁹ Logical as this explanation seems to be, there is no reason for assuming such an indirect application. In Mexico, as well as in the American southwest, *Agave*-brandy is found in use among peyote-eating tribes. The addition of ground peyote to fermented fruit juices is common in Mexico (4, 19). This, with the fact that both peyote and *Agave*-brandy are extraordinary intoxicants, provides ample opportunity for a mistaken comparison of the cactus with the drink.

3. *Minor names.*

The opponents of the peyote-cult have, in the past, conferred many derogatory names upon *Lophophora Williamsii*, most of which are still current in the literature.

Of these, the first was invented by the Spanish priest, Ortego, who called peyote *raíz diabólica*. This survives in the present literature as *diabolic root* and *devil's root*.

*Dry whiskey*¹⁰ (29) and *white mule*¹¹ are, like *mescal*, names suggesting similarity to alcohol. *White mule* is a term for illicit liquor.

Various names calling attention to the odd shape of the plant have appeared. Among these may be cited: *dumpling-cactus*, *cactus-pudding*, *turnip-cactus* (20), *biznagas* ("carrot") (14), and *tuna de tierra* ("earth-cactus") (25).

II. Plants confused with *Lophophora Williamsii*

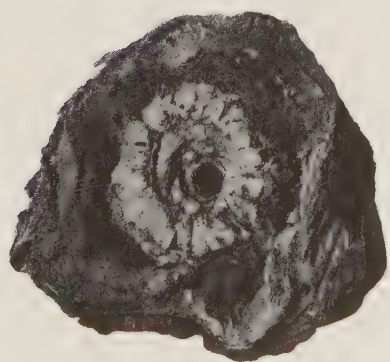
Occasionally, names properly belonging to distinctly different plants are applied to *Lophophora Williamsii* because of an actual or assumed association with it. The name *mescal bean* is an example of this type of confusion.

Recently, the Nahuatl word *teonanacatl* ("divine flesh") has become a generally accepted name for mescal buttons. This is the direct result of an erroneous identification by Safford (22) of peyote with the sacred, intoxicating mushroom of the Aztecs. Failing to find a fungus possessing narcotic properties in Mexico or the southwestern parts of the United States, and noting that the dried head of *Lophophora Williamsii* resembles "a dried mushroom so remarkably that at first glance it will even deceive a mycologist," Safford concluded that the two were identical.¹² This erroneous identification was readily accepted and has, unfortunately, become firmly established in the literature.

The first record of *teonanacatl* was made by Sahagun (25). He carefully distinguished between the mushroom and the cactus. In his history, he recorded that the Chichimecas were acquainted with the properties of many plants and had discovered peyote which took the place of wine in their diet. Concerning *nanacatl*, he wrote that they used these mushrooms like wine.¹³ In another passage,¹⁴ he described the occurrence of *teonanacatl* in grassy pastures and certain supposed therapeutic properties which made it a valuable medicine for fevers and rheumatism, but which caused visions, produced nausea, and

EXPLANATION OF THE ILLUSTRATION

FIGURE II. Mescal buttons, the dried crowns of *Lophophora Williamsii*. These are "type" specimens collected in Mexico in 1892 by the explorer, Carl Lumholtz, and sent to the Gray Herbarium. The Mexican Indians who collect peyote string the newly cut crowns on rope and hang them on the backs of mules to dry on the journey home from the peyote fields, hence the central perforation in the lower button. *Above:* View of the top of the dried crown showing the tufts of matted hair still persisting on the areolae. *Below:* View of the base of the crown where it was cut from the root. Natural size. Fruit Room Collection (unnumbered), Gray Herbarium, Harvard University.



were aphrodisiacal. According to Sahagun, the teonanacatl mushroom was small and slender-stemmed.

The fact that *nanacatl* means "mushroom" is well attested. Sahagun (25) used the expression *hongos ó nanacatl* ("mushrooms or nanacatl") in speaking of edible fungi. Hernandez (8) described teonanacatl as *teyhuinti* ("intoxicating") under the caption: *De nanacatl seu Fungorum genere*. He used the word in combinations, such as *iztacnanacame* ("white mushrooms"), *tlapalnanacame* ("red mushrooms"), and *chimalnanacame* ("yellow, orbicular mushrooms").

Further support may be found in several definitions in Siméon's Nahuatl dictionary (31):

"*Teyuinti*: qui enivre quelqu'un, enivrant; *teyuinti nanacatl*: champignon enivrant.

"*Teonanacatl*: espèce de petit champignon qui a mauvais goût, enivre, et cause des hallucinations; il est medicinal contre les fièvres et la goutte."

In the writings of de la Serna (30), reference is made to *quauhtlnanacatl* ("wild mushrooms") with properties similar to those of *ololiuqui* and *peyote*.

At the present time, the word *nacatl* is widely used in Mexican markets with reference to edible mushrooms in general (19).

The identity of teonanacatl is still unknown. It has been suggested (19) that it is *Amanita mexicana* Murrill, but this has never been corroborated. For several years, however, B. P. Reko has been actively engaged in research concerning the identity of the sacred, intoxicating Aztec mushroom and has recently found a possible solution. His findings have not yet been published.

Lophophora Williamsii is often mistakenly called *ololiuqui* or *piule*. *Ololiuqui* is variously spelled *ololiuhqui*, *ololique*, and *yololique*, a name which, it is suggested (34) is derived from the root *ololoa* meaning "something

round," with reference to the seed of ololiuqui. It is a narcotic Mexican plant, the dried seeds of which, pulverized and soaked in pulque or tepache, produce an intoxicating drink called *piule*. *Piule* was formerly used as a sorcerer's potion and is still employed as an intoxicant in secluded parts of Mexico, especially in Oaxaca (16).

There has been much dispute concerning the botanical identification of ololiuqui. Mexican authorities (8, 12, 16, 34) hold that it is *Rivea corymbosa* (L.) Hall.f. (*Turbina corymbosa* Raf., *Ipomoea sidaefolia* Choisy). This agrees with the identification of ololiuqui seeds received by the writer from Mexico (27). Urbina (34) reports that other species of *Ipomoea* are also called *ololiuqui*. Several other plants are known under the name *piule*.¹⁵

Sahagun (25) described two ololiuqui plants. One, apparently a member of the *Solanaceae*, probably *Physalis* sp., was called *xixicamatit*; this was medicinal for indigestion, but had no narcotic properties.¹⁶ The other, *coatl-xoxouhqui* ("green snake"), obviously a member of the *Convolvulaceae*, was medicinal for rheumatism and possessed drastic intoxicating properties when taken as a drink.¹⁷

Hernandez(8) described and figured ololiuqui or *coax-huitl* ("snake plant") under the caption *De Ololiuhqui seu planta orbicularium foliorum* as a member of the *Convolvulaceae* with thick, green, cordate leaves, large white flowers, and "coriander-like" seeds. He reported that it was an aphrodisiac, a stimulating tonic, a cure for syphilis, an analgesic, a carminative, a cure for colds, and a help for sprains, fractures, pelvic cramps in women, and unnatural swellings. Mixed with milk and *Capsicum* spp., and applied to the head and forehead, it was thought to be a cure for certain eye troubles.¹⁸

De la Serna (30) attributed to ololiuqui intoxicating properties similar to those of peyote and teonanacatl.

Safford (23,24) doubted that ololiuqui was a member of the *Convolvulaceae* on the basis of negative results in pharmacological experiments with the seeds of *Rivea corymbosa*. He suggested that ololiuqui was *toloache*, *Datura ceratocaula* Hook. (11) or *D. meteloides* Dunal (24), because reports of ololiuqui- or piule-intoxication indicated symptoms similar to those common in *Datura*-intoxication.

Pharmacological work has only recently succeeded in proving the presence of an active principle in *Rivea corymbosa*. Santesson (26) has found that piule (ololiuqui seeds) contains a gluco-alkaloid which is almost inactive physiologically until hydrolysis occurs. This constituent fails to give positive alkaloid reactions until, on hydrolysis with hydrochloric acid, the alkaloid is set free and reacts to standard alkaloid tests. Chemical identification of this gluco-alkaloid is needed. Although Santesson admits that "ein solcher Körper ist meines Wissens eine Seltenheit," the possibility that more such masked alkaloids exist in some of these unusual Mexican plant intoxicants is not remote. Conditions resembling this exist in the glucosides of *Digitalis* spp. (*digitalin*) and *Strophanthus* spp. (*strophanthin*) where the constituents themselves are poisonous, but their decomposition products harmless.

The effects of ololiuqui (piule) had been described (16) as not definitely narcotic, but "hypnotic-somnambulistic." The condition of the subject under piule-intoxication is very similar to hypnotism, whence the use of the plant by sorcerers. Santesson (26) confirms this with pharmacological experimentation on frogs, where partial cerebral paralysis results in a sluggish and passive condition of the animal, which he calls "eine Art Narkose, oder Halbnarkose."

There are many medicinal plants in the genus *Ipomoea* (1) with which *Rivea corymbosa* has close relation-

ships. The medicinal properties are due to the presence of irritant and purgative resins (6, 33). *Ipomoea Purga* Hayne is the best known of the score or more medicinal members of the genus.

That members of the genus *Ipomoea* were well known medicinals in Central America before the arrival of the Spanish is demonstrated by the inclusion of species of *Ipomoea* in many ancient Mayan prescriptions (21). Among those used, the following were important: *Ipomoea pentaphylla* Jacq., a medicinal for earaches (gum) and for eczema (leaves); *I. sinuata* Ort., found to be used as a general panacea; *I. carnea* Jacq. which provided, in its leaves and roots, an antidote for certain poisons; the juice of the leaves of *I. Meyeri* G. Don which was used for earaches, while the fruit, prepared with other plant ingredients, was employed as a laxative. An unidentified plant, *ix-can-ak* ("snake vine"), with tuberous roots and climbing habit (probably a member of the *Convolvulaceae*) found use as a remedy for sores on the eyes (21). Hernandez (8) reported this use for ololiuqui among the Aztecs.¹⁸

The chemistry of the *Convolvulaceae* is imperfectly known. The exact constitution of the resins of the group is unknown, but the active principles are all glucosides, with the exception of the gluco-alkaloid recently reported in *Rivea corymbosa* (26). The resins of the *Convolvulaceae* are classed as *glucoretin* (33). A number of glucosides have been reported in the family, but it is now believed that there is only one: *convolvulin* (*jalapin*, *jalapurgin*, *scammonin*); *turpethin* is now thought to be impure convolvulin, and *pharbitisin* and *ipomein* to be mixtures of constituents (33). It is evident that the *Convolvulaceae* present a promising field for further research in botany, ethnobotany, chemistry, and pharmacology.

III. Plants known as "peyote"

A list of those plants which, in Mexico, are popularly classed as "peyote" would include, in addition to the *Convolvulaceae* described above, the following: among the *Cactaceae*—*Ariocarpus fissuratus* (Engelm.) K. Schum. (16), *A. retusus* Scheidw. (2), and *A. kotschoubeyanus* (Lem.) K. Schum. (2), *Astrophytum myriostigma* Lem. (18), *A. asterias* (Zucc.) Lem. (3), and *A. capricorne* Dietrich (3), *Pelecyphora aselliformis* Ehrenb. (3), *Strombocactus disciformis* DC. (3), *Aztekium ritterii* Boedeker¹⁹ (16), *Obregonia denegrii* Fric.²⁰ (16), *Dolichothele longimamma* Britton & Rose (4), and *Solisia pectinata* Britton & Rose (4); among the *Crassulaceae*—*Cotyledon caespitosa* Haw. (4) and several other species (16); among the *Compositae*—*Cacalia cordifolia* HBK. (34, 22) and probably also several other species (34), *Senecio calophyllus* Hemsl. (4), *S. Hartwegii* Benth. (4), *S. Grayanus* Hemsl. (15), *S. tolucanus* DC. (15), *S. cervariaefolius* Sch. Bip. (4), and *S. albo-lutescens* Sch. Bip. (12); among the *Leguminosae*—*Rhychosia longeracemosa* Mart. & Gal. (15); and among the *Solanaceae*—*Datura meteloides* DC. ex Dunal (15).

All of these "peyotes" are said to be either narcotic or medicinal, a fact which seems to lend support to the Reko etymology. Chemical corroboration of these reported properties is impossible in many cases because of the lack of investigation of these somewhat obscure plants. *Anhalin*, the one "anhalonium alkaloid" usually absent in *Lophophora Williamsii*, has been found in several species of *Ariocarpus* (36) and is thought to be present in the other members of the *Cactaceae* known as *peyote*. *Astrophytum myriostigma*, *A. asterias*, *A. capricorne*, *Pelecyphora aselliformis*, *Dolichothele longimamma*, and *Solisia pectinata* have not been investigated

thoroughly as yet, but are reported (15) to have traces of toxic alkaloids.

The *Crassulaceae* have received very little chemical attention, but the species of *Cotyledon* called *peyote*, which are reported as causing insanity, contain a powerful glucoside (15). Many species of *Cotyledon* have known medicinal properties and are used in various parts of the world as vulneraries (5).

No chemical investigation has been carried out with *Cacalia cordifolia*. This "peyote" is thought by Urbina (34) and Safford (22) to have been the *Peyotl Xochimilcensis* of Hernandez, although Martinez (12) believes it to be *Senecio albo-lutescens* Sch. Bip., another "peyote." However, *Cacalia cordifolia* (*cachane*) is offered for sale in the drug markets of Jalisco as an aphrodisiac and as a cure for sterility (22). Due to the closeness of the genus *Cacalia* to *Senecio*, a genus rich in active principles, it seems probable that *Cacalia* may possess glucosides or alkaloids.

Of the more than 1200 species of *Senecio* in all parts of the world, many are used medicinally because of their bitter and astringent properties, and many are known to be poisonous (5). Although none of the species listed above has been chemically investigated, the possibility that alkaloids or glucosides may exist in these Mexican species is not remote. The following active principles have been reported in *Senecio* spp.: *senecionin*, *senecin*, *seneciofolin*, and *seneciofolidin* (6, 36).

Rhynchosia longeracemosa has never been studied chemically and, therefore, is not known to possess an active principle. The *Leguminosae*, however, are not lacking in a large number of active glucosides and alkaloids.

Datura meteloides is a well-known narcotic plant and needs no discussion beyond pointing out that Safford, likening the seeds of this plant to those of *Ipomoea* spp.,

and believing piule-intoxication, as reported by older writers, to show symptoms comparable to intoxication from *Datura* spp., considered *ololiuqui* to be this *Datura* (23, 24).

IV. Indian names of *Lophophora Williamsii*

The Indian names for *Lophophora Williamsii* are of particular interest. All of the tribes of the United States and some Mexican tribes use the term *peyote*. Since peyote has spread northward recently in the United States, the origin of the native names of peyote of several tribes is interesting. In several cases, I have found that the native word for "medicine" has been applied to the cactus while frequently retaining its original meaning. This suggests that the medicinal properties may be of fundamental importance in the diffusion of the peyote-cult throughout the plains and other tribes.

In Mexico, the native names are: among the Cora of Tepic Mountains—*huatari* (*houatari*); the Tarahumare of Chihuahua—*houanamé*, *hikuli* (*hikoli*, *jicoli*), *hikori*, *hikuli wanamé* (a very large plant, possibly a species of *Mammillaria*), *hikuli walúla saeliámi* ("peyote of great authority"), and, in songs only, *joutouri* ("symbolic plant"); the Tepehuane of Durango—*kamba* or *kamaba*; the Huichol of Jalisco—*hicouri* (*hicori*, *jicori*, *xicori*) and *hikuli*; the Opata—*pejori*; the Otomi—*beyo*; and, according to Martinez (11), among the ancient Aztecs—*teocomitl ahuitzyo* ("spineless biznaga").

In the United States, there are almost as many names for the narcotic as there are tribes acquainted with it. Among the Mescalero-Apache of New Mexico—*ho*; the Kiowa, Comanche, and Wichita of Oklahoma—*señi*, *wokowi* (*wohoki*) and *nezats*, respectively; the Winnebago of South Dakota—*huñka* (the Father Peyote).

I have found that the Kickapoo and Shawnee of Ok-

lahoma use the pre-peyote word for "medicine" to designate peyote (*Lophophora Williamsii*)—*naw-tai-no-nee* and *o-jay-bee-kee* respectively. In addition, the Kickapoo have naturalized the word *pee-yot* into their language; in this case, the word, formerly referring only to the cactus, has acquired the meaning of "medicine." Cases similar to this are reported in the literature, where, for example, the Omaha word *makan* ("medicine") now means "peyote"; this is true also for the Delaware *bii-sung* and the Taos *walena*.

V. Conclusion

A summary of the common names and taxonomic nomenclature of those members of the complex of plants known as *peyote* or confused or associated with *Lophophora Williamsii* follows:

Biznaga

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

This term is apparently applied indiscriminately to many plants.

Cactus-pudding

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Challote

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Chautle (chaute)

CACTACEAE

Ariocarpus fissuratus (Engelm.) K.Schum.

A. retusus Scheidw.

Diabolic root (devil's root, raiz diabolica)

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Dry whiskey

CACTACEAE

Ariocarpus fissuratus (Engelm.) K. Schum.
(erroneous application)

Lophophora Williamsii (Lem.) Coult.

Dumpling cactus

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Mescal

AMARYLLIDACEAE

Agave spp.

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Mescal bean

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

LEGUMINOSAE

Erythrina spp.

Sophora secundiflora (Orteg.) Lag. ex DC.

Mescal button

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Ololiuqui

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

CONVOLVULACEAE

Ipomoea spp. (?)

Rivea corymbosa (L.) Hall. f.

SOLANACEAE

Datura ceratocaula Hook. (erroneous application)

D. meteloides Dunal (erroneous application)

Peyote

CACTACEAE

Ariocarpus fissuratus (Engelm.) K. Schum.
A. kotschoubeyanus (Lem.) K. Schum.
A. retusus Scheidw.
Astrophytum asterias (Zucc.) Lem.
A. capricorne Dietrich
A. myriostigma Lem.
Aztekium ritteri Boedeker
Dolichothele longimamma Britton & Rose
Obregonia denegrii Fric.
Pelecyphora aselliformis Ehrenb.
Solisia pectinata Britton & Rose
Strombocactus disciformis DC.

COMPOSITAE

Cacalia cordifolia HBK.
Cacalia spp. (?)
Senecio albo-lutescens Sch. Bip.
S. calophyllus Hemsl.
S. cervariaefolius Sch. Bip.
S. Grayanus Hemsl.
S. Hartwegii Benth.
S. tolucanus DC.

CRASSULACEAE

Cotyledon caespitosa Haw.
Cotyledon spp.

LEGUMINOSAE

Rhynchosia longeracemosa Mart. & Gal.

SOLANACEAE

Datura meteloides Dunal

Peyote buttons

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Peyote cimarron

CACTACEAE

Ariocarpus fissuratus (Engelm.) K. Schum.

Astrophytum myriostigma Lem.

COMPOSITAE

Senecio Hartwegii Benth.

ORCHIDACEAE

Bletia campanulata LaLlave & Lex.

Cranichis (?) *speciosa* LaLlave & Lex.

Peyotillo

CACTACEAE

Dolichothele longimamma Britton & Rose

Solisia pectinata Britton & Rose

Pelecyphora aselliformis Ehrenb.

Piule

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

CONVOLVULACEAE

Ipomoea spp. (?)

Rivea corymbosa (L.) Hall.f.

LEGUMINOSAE

Rhynchosia longeracemosa Mart. & Gal.

Pithecellobium arboreum (L.) Urb.

Teonanacatl (nanacatl)

CACTACEAE

Lophophora Williamsii (Lem.) Coult. (erroneous application)

A mushroom as yet unknown.

Tuna de tierra

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

Turnip cactus

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

White mule

CACTACEAE

Lophophora Williamsii (Lem.) Coult.

FOOTNOTES

¹ For the background of the present paper, *vide*: Schultes, Richard Evans: "Peyote and plants used in the peyote ceremony" Bot. Mus. Leaflet., Harv. Univ., vol. 4, no. 8, Cambridge, April 12, 1937.

² The botanical nomenclature of this cactus is as confused as the popular names, the result of more than 100 years of taxonomic controversy. Taxonomists are far from agreement at the present time. It will be sufficient for the purposes of this paper to mention that, since its discovery by Europeans, peyote (*Lophophora Williamsii*) has been classified under the following names:

Lophophora Williamsii (Lemaire) Coulter in Contrib. U. S. Nat. Herb., vol. 3, 1894.

Peyotl zacatecensis Hernandez in De hist. plant. Nov. Hisp., 1638.

Echinocactus Williamsii Lemaire in Allg. Gartenz., vol. 13, p. 385, 1845.

Ariocarpus Williamsii Voss in Vilmorin's Blumengärtn., p. 368, 1872.

Anhalonium Williamsii Lemaire in Förster's Handb. Cact., ed. 2, p. 233, 1885.

Anhalonium Lewinii Hennings in Gartenfl., vol. 37, p. 410, 1888.

Mammillaria Williamsii Coulter in Contrib. U. S. Nat. Herb., vol. 2, p. 129, 1891.

Anhalonium rungei Hildmann in Monatschr. f. Kakteenk., vol. 3, p. 68, 1893.

Anhalonium subnodosum Hildmann in Monatschr. f. Kakteenk., vol. 3, p. 68, 1893.

Lophophora Williamsii lewinii Coulter in Contrib. U. S. Nat. Herb., vol. 3, p. 131, 1894.

Anhalonium Jourdanianum Lewin in Ber. Deutsch. Bot. Gesel., vol. 12, p. 289, 1894, and in Monatschr. f. Kakteenk., vol. 6, p. 180, 1896.

Mammillaria Lewinii Karsten in Deutsch. Fl., ed. 2, vol. 2, p. 457, 1895.

Echinocactus Lewinii Hennings in Monatschr. f. Kakteenk., vol. 5, p. 94, 1895.

Anhalonium visnagra Hildmann in Monatschr. f. Kakteenk., vol. 6, p. 174, 1896.

Lophophora Williamsii Thompson in Rept. Mo. Bot. Gard., vol. 9, p. 133, 1898.

Echinocactus Jourdanianus Rebut in Monatschr. f. Kakteenk., vol. 15, p. 122, 1905.

In the cases of *Anhalonium visnagra*, *A. rungei*, and *A. subnodusum*, the plants were described, but not figured. The descriptions leave little doubt but that the plants were different forms of *Lophophora Williamsii* (3).

³ The following synonyms of *Ariocarpus retusus* appear in the literature as additional peyote-cactuses: *Anhalonium prismaticum* Lem., *Mammillaria prismatica* Hemsl., *Cactus prismaticus* Kuntze, *Anhalonium furfuraceum* Coult., *Mammillaria furfuracea* S. Wats., *Anhalonium pulvilligerum* Lem., and *Anhalonium elongatum* Salm-Dyck.

⁴ This plant is unknown.

⁵ Augustin Hunt y Cortes, author of this etymology, also gives *pepeyoni* the significance of "child" (20).

⁶ Siméon (31) defines *peyotl* or *peyutl* as: "Plante dont la racine servait à fabriquer une boisson qui tenait lieu de vin; cocon de ver à soie; pericarde, enveloppe du coeur."

⁷ Hernandez (8) used this word as a name for a plant characterized by a particularly strong odor, which he described under the title: *De Yauhltli*.

⁸ Spinden (32) gives to *guayule* the entirely different meaning of "old-fashioned rubber." This he derives from an etymology in which the word *hue* or *guay* ("old") and the word *ulli* ("rubber") are combined to form *guayule*.

⁹ *Sophophora secundiflora* contains a narcotic alkaloid (*cytisine*) capable of rendering a person unconscious for long periods. For a detailed account of mescal beans (*Sophora secundiflora* and *Erythrina* spp.) consult the reference in footnote 1.

¹⁰ *Dry whiskey* is also erroneously applied to *Ariocarpus fissuratus* (Engelm.) K. Schum.

¹¹ It is recorded (10) that, during the Civil War, a group of Texas Rangers were captured, and, due to food shortage, came near starvation. They were saved by Indian friends who smuggled mescal buttons in to them. The captives used the buttons for food, calling them "white mule," a name which has survived for *Lophophora Williamsii* in rural parts of Texas.

¹² Reko (17) points out philologically that *teonanacatl* means "divine food of a soft or fleshy nature." In this light, it is difficult to see how the term ever could have referred to the corky, though succulent, peyote, much less to hard, brittle mescal buttons.

¹³ “Tenian así mismo gran conocimiento de yerbas y raíces, y conocían sus calidades y virtudes; ellos mismos descubrieron y usaron primero la raíz que llaman *peiotl*, y los que comían y tomaban, la usaban en lugar de vino, y lo mismo hacían de los que llaman *nana-catl* que son los hongos malos que emborrachan también como el vino . . .” (25).

¹⁴ “Hay unos honguillos en esta tierra que se llaman *teonanacatl*, criarse debajo del heno en los campos ó páramos; son rundondos, tienen el pie altillo, delgada y redondo, comidos son de mal sabor, dañan la garganta y emborrachan: son medicinales contra las calenturas y la gota: hanse de comer dos ó tres no más: los que los comen ven visiones y sienten bascas en el corazón, á los que comen muchos de ellos provocan á lujuria, y aunque sean pocos” (25).

¹⁵ Reko (15) states that two *Leguminosae*: *Rhynchosia longeracemosa* Mart. & Gal. and *Pithecellobium arboreum* (L.) Urb., are also called *piule*. Both are narcotic, and *Rhynchosia longeracemosa* is also known as *peyote*. This evidence, together with the fact that Sahagún (25) described a plant probably belonging to the *Solanaceae* as *ololiuqui*, tends to suggest that, as in the case of *peyote*, many plants are classed under the terms *ololiuqui* and *piule*.

¹⁶ “Hay otra yerba que se llama *ololiuhqui* ó *xiricamatic*, tiene las hojas como de *miltomatl*, ralas las flores, son amarillas, no son de provecho ellas, ni las hojas, ni ramas” (25).

¹⁷ Hay una yerba que se llama *coatlxorouhqui*, y cria una semilla que se dice *ololiuhqui*; esta semilla emborracha y enloquece, danla por bebidzos para hacer daño á los que quieren mal, y los que la comen pareceles que ven visiones y cosas espantables; danla á comer ó á beber, los hechiceros ó los que aborrecen á algunos para dáñarlos. Esta yerba es medicinal, y su semilla usase para la gota moliéndola y poniéndola en el lugar donde está (25).

¹⁸ Attention is called to the fact that this use of *ololiuqui* was one of the many medicinal uses of several species of *Ipomoea* among the Maya (21).

¹⁹ *Aztekium ritterii* Boedeker in Monatschr. f. Deutsch. Kakt. Gesel., vol. 3, p. 52, 1929.

²⁰ *Obregonia denegrii* Fric. in Zeitschr. f. Sukkultenk., vol. 3, p. 184, 1927-28.

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